

## An Evidence-Based Guideline of Birth Ball Exercise during the First Stage of Labor on the Outcome of Birthing Criteria

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### Abstract:

**Background:** The birth ball is known to enhance labor efficiency, promote maternal comfort, and facilitate fetal head descent. **Aim of study:** This study aimed to evaluate the effect of an evidence-based guideline for birth ball exercises during the 1<sup>st</sup> stage of labor on the outcome of birthing criteria. **Design:** An experimental research design was adopted to achieve research's aim. **Sample:** The study included two hurried laboring women selected through Anon-probability purposive sample divided into two equal groups: intervention and control. **Setting:** The research was conducted in the Unit of Labor and Delivery at Benha University Hospital. **Tools:** Four tools were used: **Tool (I):** a structured interview questionnaire to assess women's general traits and obstetric history; **Tool (II):** a partograph to monitor labor progress, **Tool (III):** Visual Analog Scale (VAS) to measure pain intensity; **Tool (IV):** a chart of APGAR score to assess neonatal condition. **Results:** The control and intervention groups did not differ statistically significantly in terms of obstetric data or demographics. Nonetheless, the intervention group showed statistically significant favorable associations between birth ball exercises and labor progress, while the control group indicated delayed labor improvement with very statistically significant variances ( $p < 0.0001$ ). **Conclusion:** Labor progress and birth outcomes were positively impacted by the use of a birth ball via the 1<sup>st</sup> labor stage. **Recommendation:** Enhance women to utilize birth balls during the initial stage of labor as one of the key strategies to enhance labor improvement, lessen pain, and achieve a more satisfying delivery experience.

**Keywords:** Based Guideline, Birth ball, Birthing Criteria Evidence, First stage of labor, Outcome.

### Introduction:

Labour refers to a series of anatomical and physiological changes occurring in the female reproductive system, characterized by rhythmic uterine contractions and relaxations accompanied by gradual cervical effacement and dilatation, ultimately resulting in the delivery of the products that result from conception. The 1<sup>st</sup> stage of labour is marked by painful uterine contractions and concludes when complete cervical dilatation is achieved

(Arranz et al., 2018). A 1<sup>st</sup> stage of labour is classified into three stages. The cervix dilates from zero to three cm during the latent period. Cervical dilatation increases from between four and seven centimeters during the active phase, and from eight to ten centimeters during the transition period (Selvan & Kumar, 2019). During this stage, pain associated with uterine contractions is commonly experienced as cramping sensations brought on by uterine tissues stretching and cervical dilation. This pain is

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conveyed through spinal nerves and is perceived in the abdominal and lumbosacral regions. Many women report labor severe pain suffering they have ever gone through (Garbelli & Lira, 2021).

An essential component of intrapartum care is still effective labor pain control. Therefore, one of the most vital tasks of nurses and other healthcare team is to improve the rest and pleasure of females giving birth. Women may feel more at ease and in charge during childbirth if health issues are less common (Arranz et al., 2018).

The ball birth is averred recent not pharmaceutical in nature method introduced to enhance the labor experience. Its use involves specific movements and exercises that are believed to assist the fetus in achieving an optimal position within pelvis and to improve labor progression (Farrag and Omar 2018).

The ball birthing is a big, inflatable rubber ball designed to safely support a pregnant woman's weight. Ball enhances pelvic expansion and flexibility of joints the pelvic, allowing the fetus to descend more easily through the birth canal. Additionally, the birthing ball aids in strengthening the pelvic floor muscles, which play a crucial role during the moving phase of labor (Apriani et al., 2019).

The ball birth can support maternal position alteration and serve as a comfort aid during labor. Its use during childbirth offers several benefits, including decreased anxiety and pain levels, reduced reliance on analgesic medications, quicker postpartum recuperation and the reduction of the fetus's lowest portion, which boosts comfort and support (Makvandi et al., 2019).

As the primary caretakers via the childbirth, nurses can decrease the require for medical interventions by putting in place efficient comfort measures that promote and facilitate physiological labor. They are required to take an active role in guiding women toward alternative positions and available resources to enhance comfort throughout labor. In order to help parturient women comprehend the advantages of utilizing birth balls, nurses who care for women in the initial phase of labor should give consistent, clear, and recent information (Abo El Enin, 2018).

### **Research Significance:**

The majority of females give birth while lying down on a bed in medical facilities. This position puts the weight of the fetus as well as uterus on the abdominal blood arteries, which can impair blood flow and raise the risk of labor complications like extended labor and caesarean delivery (Farrag and Omar, 2018). According to the (WHO)World Health Organization, the suitable rate of cesarean sections (CS) in any part of the world should not be higher than ten percent to fifteen percent. The rate of CS deliveries has sharply increased despite WHO recommendations. In Egypt, fifty-two percent of women have had a CS, which is 3.5 times more common than it must be (Sheishaa et al., 2019).

By promoting labor to proceed depend on more new data regarding normal labor, new labor rules may assist promote vaginal birth. By encouraging efficient labor progress, the usage of a birthing ball plays a significant role as a non-pharmacal strategy to pain management and enhances a good childbirth experience (WHO, 2020). Thus, the purpose of this research was to assess how birthing ball exercises impacted the results of birthing criteria during the first stage of labor.

### **Purpose:**

This research aimed to assess the effect of an evidence-based guideline of birth ball exercise during the 1<sup>st</sup> stage of labor on the outcome of birthing criteria

### **Research Hypotheses:**

During the early phase of labor, women who used the experimental birth ball exercise would have stronger uterine contractions and better birthing outcomes.

### **Subject as well as Methods:**

**Research Design:** To accomplish the research's goal, an experimental approach design was employed.

**Research Setting:** Research was performed at Benha University Hospital's obstetric and gynecological department's labor and delivery unit.

### **Sample type:**

Purposive anon-probability approach technique was utilized for data collection

### **Sample Size:**

Two hundred women primiparous were divided into two parallel groups at random: a control group (CG) (one hundred) and a study group (SG) (one hundred).

### **Sampling criteria**

The following criteria were used to enroll parturient women in the current study:

#### **Inclusion criteria:**

- 1) Primipara, the entire term, and in the 1<sup>st</sup> stage of labor's latent phase
- 2) Age range: between twenty and thirty-five
- 3) When admitted, the membrane was intact.
- 4) A typical pregnancy course with a single, full-term, cephalic fetus.
- 5) Devoid of any obstetrical and medical conditions.

### **Sample Technique:**

Following that, the individuals who satisfied the previously stated requirements were split into two parallel groups.

**Group one** SG (one hundred): obtained recent recommendations for birth ball exercises.

**Group two** CG (one hundred): obtained routine care of the hospital

### **Instruments:**

Four tools were employed to gather data:

**Instrument (I): A structured questionnaire for interviews:** It is divided into two sections: First section: Women's general characteristics, including age, education level, occupation, place of residence, and BMI.

**Second part:** Obstetric history, comprising information about the number of pregnancies, gestational age, last menstrual cycle, and estimated weight of the fetus.

**Instrument (II) "Standerlized chart of Partograph" (WHO 1994).** The WHO created it to track the course of labor, including cervical dilation and effacement, fetal head descent, and the pattern of uterine contractions in terms of duration, frequency, interval, and intensity. Fetal condition, labor progress, and mother condition were its three primary constituents.

**Instrument (III): VAS, McCaffery and Pasero (1999)** created this standardized linear tool. The researchers used it to evaluate the level of pain both pre as well as post the intervention. It is a self-report tool that consists of a ten centimeter horizontal line that depicts the subjective evaluation of pain severity. This tool was added after an expert jury assessed it.

**Instrument (IV) Apgar score,** as defined by (Apgar and James, 1962) measures the newborn's general state at the 1<sup>st</sup> and 5<sup>th</sup> minutes in order to assess the neonatal results.

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### **Validity of Tools:**

Three obstetric and gynecological nursing specialists assessed the content validity of the instruments to guarantee the validity and dependability of the survey.

### **Reliability of Tools:**

The researchers established reliability in order to assess the tools' internal consistency. Alpha Cronbach reliability was used to compare responses from multiple tests. The study group's dependability coefficient was 0.97, while the control groups was 0.80.

### **Ethical consideration**

- Each lady gave her oral consent to participate in the study, which she might revoke at any time.
- There was no risk to the pupils' physical, social, or psychological well-being.
- Strict secrecy was applied to all information gathered.
- The amount of time needed for the study was explained to each participant.

### **Pilot study:**

Twenty women, or ten percent of the entire sample, participated in a pilot study to evaluate the study instruments' usability, simplicity, and clarity and time needed to accomplish the questionnaire. The pilot research participants were involved to the main research patriciate since no changes were needed.

### **Field work:**

Following formal authorization from the director of the previous hospital and consent from the head of the obstetrics ward, data were gathered over a six-month the time from the start of July 2021 to the end of December 2021. In order to gather the necessary sample,

the researchers visited the study location twice a week from 9 a.m. to 7 p.m. They presented themselves and discussed the research's objectives to woman who satisfied the requirements for sample inclusion. Parturient women were told that participation was completely optional and that they could decline or stop at any moment without facing any repercussions.

### **The process is carried out by researchers in three stages:**

#### **Preparatory phase**

In order to gather information about the parturient women's general characteristics, the researchers used Tool I to interview them throughout that phase. After being screened, all women in the last phase who satisfied the eligibility requirements were randomized to either the study or CG. Oral agreement for participation was obtained after the participants were welcomed and the goal of the study was explained.

Upon admission, an initial assessment was conducted. Women in the latent phase of the first stage of labor must undergo physical examinations to detect general maternal condition and vital signs; abdominal assessments to assess the fundal level, lie, appearance, position, advancement of the fetus, and fetal heart rate using external electric fetal monitoring devices; and vaginal exams to determine cervical dilatation, disappearance, membrane status, station, and the presenting part in order to meet the sample criteria.

#### **Implementation phase:**

During the last period, every parturient woman in the SG was contacted one-on-one. The benefits of using a birth ball via the 1<sup>st</sup> phase of labor were explained to them. To help women understand, the researchers

created a guidebook in basic Arabic with a variety of illustrations. Additionally, a 10-minute video demonstration of how to utilize the birth ball in various positions during the early phase of labor is shown, then a live indication by the researchers.

During labor, every parturient woman in the SG received a birth ball as well as was told to use it for the following postures and motions:

I. Perched on a birth ball: Based on the mother's height, the investigator chose the right ball size as well as set it on the floor close to the bed. The women were helped to sit down on the ball with support from side of the bed. asking the mother to spend five to ten minutes sitting on a birth ball while holding her shoulder. To maintain the fetus aligned in the pelvis to promote the fall of the head of the fetus as well as to broaden the pelvis to hasten labor, the woman sits with her legs spread apart and bent at a 90-degree angle.

II. Swaying motions: For five to ten minutes, the mother swayed the birth ball side to side or forward and backward.

III. Leaning over the ball: For five to ten minutes, the mother leaned over the birth ball and hugged it while on her hands and knees.

IV. The mother squatted while leaning against a birth ball that was positioned against the wall.

IIV. Over the ball and backward

With your back to the birth ball, take a seat on the floor. the ground-based feet. Roll around while using the birth ball and covering with your upper body and two arms. In midair, the pelvis will move in a way that prepares it for childbirth.

The participants were urged to complete all birth ball activities for ten to twenty minutes

at least once every hour after the latent phase ended until ruptures of membrane and began stimulant uterus through oxytocin intravenous. Women in the control group, on the other hand, received simply standard hospital care and no further interventions.

### **Evaluation phase**

-The impact of performing birth ball exercises during the initial stage of labor was compared between the study and control groups, and the labor outcomes were evaluated by the researchers using:

-Evaluating the characteristics of uterus contraction (time, intensity, frequency interval, and dilatation cervix, rate of dilatation cervix per hour), fetal head descent, delivery mode, duration of the 1<sup>st</sup>, 2<sup>nd</sup>, and 3<sup>rd</sup> stages of labor, maternal condition, and fetal condition using a partograph.

-A visual analogue scale of pain scale is usage to measure the degree of labor pain following the latent, active, and transitional phases of the first phase of labor.

-Apgar's score at the 1<sup>st</sup> and 5<sup>th</sup> minutes of life is used to measure neonatal physical outcomes, such as baby delivery and weight.

### **Statistical analysis:**

Used the computer to code, organize, analyze, and tabulate the gathered data. Using the SPSS, version 15, data was shown in tables and graphs based on the kind of variables.

### **Results:**

**Table (1):** Clears that 40% and 45% of the control and study groups were in preparatory school, while more than half (64% and 56%, respectively) of both groups were between the ages of 20 and 24 with Mean  $\pm$ SD (24.02 $\pm$ 3.051, 24.62 $\pm$ 3.164). Additionally, around 70% and 74% come from rural areas. Furthermore, housewives made up the

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majority of both groups (70% and 58%, respectively).

**Table (2):** Indicates that there were no statistically significant variances between the two groups' mean uterine contraction frequency, duration, interval, and intensity during the latent period. During the active and transitional phases, there was a very statistically significant variance ( $p < 0.0001^{**}$ ).

**Table (3):** Demonstrates that the control and study groups did not differ statistically significantly. in relation to last phase P = (0.426) dilatation of the cervix. In terms of the rate of dilatation of the cervix per hour during the active part of the 1<sup>st</sup> stage of labor, there was a progression and a highly statistically significant variances between the two groups, with the control group's mean being  $1.14 \pm 0.34$  and the study group's mean being  $1.84 \pm 0.36$ .

**Table (4):** Justifies that there weren't statistically significant variances between the two groups during the latent phase. However, during the active phase, the study group's fetal head descent showed improvement. During the transitional phase, there was a significant statistical difference between the two groups, with the control group's mean ( $0.700 \pm 0.784$ ) and the study group's mean ( $1.25 \pm 0.701$ ).

**Table (5):** Shows how long each stage of labor takes. The duration of the first stage of labor was not statistically significant during the latent phase, but it was highly statistically significant during the active and transitional phases, with the control group's mean ( $6.21 \pm 2.01$  &  $1.04 \pm 0.75$ ) compared to the study group's ( $5.81 \pm 2.14$  &  $0.9 \pm 0.74$ ), respectively. In comparison to the control group ( $17.510 \pm 1.3446$ ), the research group's mean total length of normal labor was significantly less ( $14.740 \pm 1.2029$ ).

**Table (6):** Demonstrates that while there was a highly statistically significant variation in pain levels throughout the active and transitional periods ( $p < 0.001^{**}$ ), there was no statistically significant variation in mean pain scores during the latent phase of the first phase of labor ( $p = 0.071$ ).

**Table (7):** Displays the average Apgar score for newborns in two groups at the 1<sup>st</sup> and 5<sup>th</sup> minutes. According to the study, there was a statistically significant variances between the study group and the control group. The study group's Apgar scores at the first and fifth minutes were higher than those of the control groups.

**Table (1): Frequency of women in the two groups regarding to general traits (n = 200).**

| Characteristics      | Control group<br>(n=100) |      | Study group<br>(n=100) |      |
|----------------------|--------------------------|------|------------------------|------|
|                      | No                       | %    | No                     | %    |
| Age (in years)       |                          |      |                        |      |
| 20 -                 | 64                       | 64.0 | 56                     | 56.0 |
| 25-                  | 28                       | 28.0 | 34                     | 34.0 |
| 30-35                | 8                        | 8.0  | 10                     | 10.0 |
| Mean $\pm$ SD        | 24.02 $\pm$ 3.051        |      | 24.62 $\pm$ 3.164      |      |
| Level of education   |                          |      |                        |      |
| Read and write       | 43                       | 43.0 | 40                     | 40.0 |
| Middle education     | 45                       | 45.0 | 40                     | 40.0 |
| University education | 12                       | 12.0 | 20                     | 20.0 |
| Residence            |                          |      |                        |      |
| Urban                | 26                       | 26.0 | 30                     | 30.0 |
| Rural                | 74                       | 74.0 | 70                     | 70.0 |
| Occupation           |                          |      |                        |      |
| Housewife            | 70                       | 70.0 | 58                     | 58.0 |
| Working              | 30                       | 30.0 | 42                     | 42.0 |

**Table (2) Frequency of women regarding to traits of uterine contraction, including frequency (per ten minutes), duration (in 2<sup>nd</sup> ), and interval (in minutes) (n = 200).**

| <b>Characteristics of uterine contraction</b>              | <b>Control group<br/>(n=100)</b> | <b>Study group<br/>(n=100)</b> | <b>t test</b> | <b>p-value</b> |
|------------------------------------------------------------|----------------------------------|--------------------------------|---------------|----------------|
| <b>Mean<math>\pm</math>SD</b>                              | <b>Mean<math>\pm</math>SD</b>    | <b>Mean<math>\pm</math>SD</b>  |               |                |
| <b>Frequency of uterine contraction/10 minutes through</b> |                                  |                                |               |                |
| Latent phase                                               | 1.96 $\pm$ .575                  | 2.07 $\pm$ .781                | 2.282         | 0.07           |
| Active phase                                               | 2.81 $\pm$ .486                  | 4.41 $\pm$ .933                | 15.208        | <0.0001**      |
| Transitional phase                                         | 3.68 $\pm$ .766                  | 5.56 $\pm$ .580                | 14.457        | <0.0001**      |
| <b>Duration of uterine contraction/seconds</b>             |                                  |                                |               |                |
| Latent phase                                               | 25.07 $\pm$ 4.374                | 26.58 $\pm$ 5.31               | 2.101         | 0.071          |
| Active phase                                               | 37.68 $\pm$ 4.440                | 48.54 $\pm$ 6.254              | 16.718        | <0.0001**      |
| Transitional phase                                         | 52.47 $\pm$ 6.512                | 71.52 $\pm$ 9.571              | 21.981        | <0.0001**      |
| <b>Interval of uterine contraction</b>                     |                                  |                                |               |                |
| Latent phase                                               | 17.62 $\pm$ 3.283                | 16.91 $\pm$ 2.271              | 1.532         | 0.213          |
| Active phase                                               | 13.90 $\pm$ 2.98                 | 9.44 $\pm$ 1.696               | 13.009        | <0.0001**      |
| Transitional phase                                         | 10.00 $\pm$ 2.132                | 3.78 $\pm$ 1.069               | 26.079        | <0.0001**      |
| <b>Intensity of uterine contraction</b>                    |                                  |                                |               |                |
| Latent phase                                               | 5.78 $\pm$ 0.89                  | 4.02 $\pm$ 1.15                | 0.542         | 0.462          |
| Active phase                                               | 6.70 $\pm$ 1.11                  | 7.80 $\pm$ 0.92                | 63.10         | 0.000**        |
| Transitional phase                                         | 8.08 $\pm$ 1.15                  | 9.02 $\pm$ 0.57                | 70.09         | 0.000**        |

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**Table (3): Frequency of women in the two groups regarding to cervical dilatation via last phase and active phase (n=200).**

| Variable                                                 | Control group<br>(n=100) |      | Study group<br>(n=100) |      | Test of<br>significance | p-<br>value |
|----------------------------------------------------------|--------------------------|------|------------------------|------|-------------------------|-------------|
|                                                          | No                       | %    | No                     | %    |                         |             |
| Cervical dilatation through latent phase                 |                          |      |                        |      |                         |             |
| Mean ±SD                                                 | 2.67±0.62                |      | 2.72±0.51              |      | t=1.51                  | 0.426       |
| Rate of cervical dilatation through active phase (cm/hr) |                          |      |                        |      |                         |             |
| 1 cm/hr                                                  | 20                       | 20.0 | 8                      | 8.0  | X <sup>2</sup> =18.64   | 0.000*      |
| 1.2 cm/hr                                                | 38                       | 38.0 | 20                     | 20.0 |                         |             |
| 1.4 cm/hr                                                | 18                       | 18.0 | 32                     | 32.0 |                         |             |
| 1.6 cm/hr                                                | 24                       | 24.0 | 40                     | 40.0 |                         |             |
| Mean ±SD                                                 | 1.14±0.34                |      | 1.84±0.36              |      |                         |             |

**Table (4): Frequency of women in the two groups regarding to fetal head decent (n=200).**

| Variable                                    | Control group<br>(n=100) | Study<br>group<br>(n=100) | Test of<br>significa<br>nce | p-value |
|---------------------------------------------|--------------------------|---------------------------|-----------------------------|---------|
|                                             | Mean±SD                  | Mean±SD                   |                             |         |
| Descent of fetal head                       |                          |                           |                             |         |
| Descent of fetal head in latent phase       |                          |                           |                             |         |
| Mean±SD                                     | -0.92±0.849              | -<br>1.00±0.785           | 2.509                       | 0.285   |
| Descent of fetal head in active phase       |                          |                           |                             |         |
| Mean±SD                                     | -0.37±1.32               | 0.35±1.24                 | 16.33                       | 0.003*  |
| Descent of fetal head in transitional phase |                          |                           |                             |         |
| Mean±SD                                     | 0.700±0.784              | 1.25±0.70                 | 37.16                       | 0.000** |

**Table (5): Frequency of women in the two groups regarding to duration of various stages of normal labour (n=200).**

| <b>Duration of stages of labour</b>         | <b>Control group (n=100)</b> | <b>Study group (n=100)</b> | <b>Test of significance</b> | <b>p-value</b> |
|---------------------------------------------|------------------------------|----------------------------|-----------------------------|----------------|
|                                             | <b>Mean±SD</b>               | <b>Mean±SD</b>             |                             |                |
| <b>Duration of first stage</b>              |                              |                            |                             |                |
| latent phase                                | 8.65±1.74                    | 8.51±1.24                  | 0.985                       | 0.871          |
| Active phase                                | 6.21±2.01                    | 5.81±2.14                  | 2.05                        | 0.000**        |
| Transitional phase                          | 1.04±0.75                    | 0.9±0.74                   | 3.65                        | 0.000**        |
| <b>Duration of second stage</b>             |                              |                            |                             |                |
| Mean ±SD                                    | 45.87±10.25                  | 32.51±5.24                 | 5.25                        | 0.000**        |
| <b>Duration of third stage</b>              |                              |                            |                             |                |
| Mean ±SD                                    | 28.72 ± 4.78                 | 14.63±3.15                 | 7.97                        | 0.000**        |
| <b>Total mean duration of normal labour</b> |                              |                            |                             |                |
| Mean ±SD                                    | 17.510± 1.3446               | 14.740±1.2029              | t=15.35                     | 0.000**        |

**Table (6) Frequency of women in the two groups regarding to pain degree of the 1<sup>st</sup> stage of labour regarding to cervical dilatation (n=200)**

| <b>Degree of pain at (cervical dilataion)</b> | <b>Control group (n=100)</b> | <b>Study group (n= 100))</b> | <b>t test</b> | <b>p-value</b> |
|-----------------------------------------------|------------------------------|------------------------------|---------------|----------------|
|                                               | <b>Mean ±SD</b>              | <b>Mean±SD</b>               |               |                |
| <b>Latent phase &gt;3cm</b>                   | 5.780±.8942                  | 4.020±1.1545                 | 2.101         | .071           |
| <b>Active phase &gt;6cm</b>                   | 7.803±-.9296                 | 6.700±1.1146                 | 9.738         | <0.0001**      |
| <b>Transitional phase &gt;8cm)</b>            | 9.020±5752                   | 8.080±-1.1519                | 13.862        | <0.0001**      |

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Table (7): Frequency of women in the two groups regarding to Apgar score (n=200).

| Apgar score              | Study group<br>(n=100) |        | Control group<br>(n=100) |        | Test of<br>significance | p-<br>value |
|--------------------------|------------------------|--------|--------------------------|--------|-------------------------|-------------|
|                          | No                     | %      | No                       | %      |                         |             |
| new born<br>weight(Kg)   | 3.1150                 | .40735 | 3.0125                   | .33404 | t=1.946                 | .053        |
| Apgar score at 1 minutes |                        |        |                          |        |                         |             |
| Good (8-10)              | 55                     | 55.0   | 40                       | 40.0   | X <sup>2</sup> =4.511   | 0.034*      |
| Moderate (5-7)           | 45                     | 45.0   | 60                       | 60.0   |                         |             |
| Sever <4                 | 0                      | 0.0    | 0                        | 0.0    |                         |             |
| Mean ±SD                 | 8.500                  | .6113  | 6.930                    | 1.4160 |                         |             |
| Apgar score at 5 minutes |                        |        |                          |        |                         |             |
| Good (8-10)              | 98                     | 98.0   | 90                       | 90.0   | X <sup>2</sup> =5.674   | 0.017*      |
| Moderate (5-7)           | 2                      | 2.0    | 10                       | 10.0   |                         |             |
| Sever <4                 | 0                      | 0.0    | 0                        | 0.0    |                         |             |
| Mean ±SD                 | 9.160                  | .7152  | 8.060                    | 1.2538 |                         |             |

following examined hypothesis was supported by the study's findings.

### Discussion:

Delivery balls are said to be an easy, safe, and efficient way to speed up labor and ease pain. They have been utilized in many different delivery settings. Pregnant and childbearing women can benefit physically from birth ball exercises in a number of ways, including less anxiety, less frequent opiate usage, easier head rotation of the fetus and descent, shorter labor duration, and improved wellbeing. **Makvandi et al., (2019).**

The actual study aimed to evaluate the effect of an evidence-based guideline for birth ball exercises during the 1<sup>st</sup> stage of labor on the outcome of birthing criteria. This goal was achieved by the results of the current study, which showed that during the 1<sup>st</sup> stage of labor, parturient women's 1<sup>st</sup> stage progress was enhanced by performing birthing ball exercises. The intervention group's dilatation of cervix was significantly higher, their uterine contractions were better, and their first stage labor duration was shorter. The

According to the current study's findings, most general characteristics and reproductive histories were similar across study and control group members. Similarities like this reduce the number of unrelated factors that could influence how the targeted intervention affects labor advancement.

This result was in line with **Mirzakhani et al. (2015)** that identified no significant variations in BMI, age groups, education, or occupation type. Additionally, **Sheishaa et al. (2019)**, who clarified that there was no discernible variation between the two groups in terms of groups age, level of education, job, domicile, and BMI. The two groups were compatible.

This research found that birth ball workouts enhance the contraction process of the uterus during labor. The research found a positive significant correlation but no statistically significant difference in the mean frequency,

length, interval, and strength of uterine contractions between the two groups during the latent period. Increased uterine contractions per 10 minutes, stronger contractions, longer contractions, and shorter intervals after the intervention during the active and transitional periods were all indicative of this in the study group. Similarly, there is less uterine contraction progress in the control group. Via the phases active as well as transition, however, there was a highly statistically significant.

Sitting on the birth ball and performing birth ball exercises have significant impacts. The sitting position uses the gravity effect, which may lessen aorto-caval compression and strengthen uterine contractions. It also helps the head of the fetus descend into the pelvis, which puts direct pressure on the cervix and increases the continuous, regularity, and strength of contractions of the uterus. Dilation of the cervix and the successful completion of the 1<sup>st</sup> stage of labor are made easier by the increased contraction effectiveness.

This study was corroborated by **Aprian et al. (2019)**, who detected that the intervention group's mean uterine contraction duration was 48.94 seconds, SD 12.64, whereas the control groups was 46.40 seconds, SD 14.23,  $p = 0.863$ . The experiment group's uterine contraction intervals were 159,11 seconds, SD 39,10, whereas the CG intervals were 158,38 seconds, SD 40,78, with  $p=537$ . However, prior to intervention, there were no statistically significant variations between the experiment and control groups' uterine contraction durations and intervals.

This study worked with **Sharma (2020)**, who explained that compared to the CG, primigravida moms in the experimental group

had considerably lower pain levels and longer uterine contraction durations ( $p < 0.001$ ). The results also show that using a birthing ball during labor helps enhance some fetal maternal parameters and reduce pain.

The current study's results show that there is no statistically significant variations in cervical dilatation through latent phase between the SG and CG ( $P=0.426$ ). In terms of the rate of cervical dilatation per hour during the active phase of the 1<sup>st</sup> stage of labor, the SG's rate was higher than the CG's, and there was a highly significant variations between the two groups, with the study group's mean being  $1.84 \pm 0.36$  and the control group's mean being  $1.14 \pm 0.34$ .

These results were in line with those of a study carried out in Alexandria by **Zaky (2016)**, which looked at how pelvic rocking movements using the sitting position affected the birth ball's progression during the 1<sup>st</sup> stage of labor. Regarding cervical dilatation prior to intervention, this study found no statistically significant difference between the intervention and CG ( $P=0.568$ ). However, following the intervention, there was a highly statistically significant difference between the two groups because the study group's mean cervical dilatation score was larger than the control group's ( $P = 0.0001$ ).

The results of the study showed a statistically significant variations in the fetal head's descent and rotation between the two groups. During the active stage, the study group showed an enhancement in fetal head descent. During the active phase, there was a statistically significant variances between the SG and CG. During the changeover period, there was a statistically significant variances between the two groups.

Birth ball exercises were found to have a statistically significant favorable link with

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fetal head descent in the study group following the intervention when compared to the control group. Regular pelvic rocking movements done while seated on the birth ball may be the cause of this observation. aid to guide the head of fetus into the pelvis by facilitating an increase in the antro posterior diameter of the pelvis however the woman leans forward and backward.

This result is consistent with **Grenvik et al. (2021)**, who found that a parturient adopting an alternate upright position had a favorable gravity impact in aligning the fetus to the canal of delivery, enhancing pelvic outlet diameter, intensifying contractions of the uterus, and lowering intrapartum complications for both the mother and the newborn.

In terms of labor duration, the outcomes of this research show that the study group's mean duration of the first phase (latent, active, and transitional phases), as well as the 2<sup>nd</sup> and 3<sup>rd</sup> stages of labor, was significantly shorter than that of the CG. This demonstrates the advantages of using the birth ball, which makes it easier to sit and kneel upright during labor. The birth ball strengthens the pelvic fascia and pelvic floor muscles, especially the pubococcygeus and levator ani muscles. By enabling laboring women to move freely and engage in perineal exercises, it improves uterine blood flow, facilitates fetal descent and rotation, and encourages active engagement in the labor process. Enhancing the cervix's dilatation and contractions' efficacy.

According to **Mutoharoh et al. (2020)**, the duration of the 1<sup>st</sup>, 2<sup>nd</sup>, and 3<sup>rd</sup> phases of labor was considerably shorter in the treatment group than in the control group, which is consistent with these findings.

According to **Ulfa's (2021)** research, the maternity duration of labor for the first stage of labor is shorter in the treatment group. According to the findings, the treatment group's mean labor time was  $130.38 \pm 39.28$  minutes, while the CGs was  $257.85 \pm 65.16$  minutes. Also, the treatment group experienced a shorter second stage of labor ( $30.08 \pm 11.38$  minutes) compared to the CG ( $36.85 \pm 12.41$  minutes).

There weren't statistically significant variances in labor pain between the two groups during the latent phase of the first stage of labor, but there was a highly statistically significant variances in pain scores during the active and transitional phases ( $p < 0.001^{**}$ ).

The results mentioned that pain degree was considerably lower in the intervention group after controlling for a number of variables that potentially affect labor pain. Additionally, the current study showed that using the birth ball during the early stage of labor decreased labor pain in a statistically meaningful way. This might be the result of using a birth ball for pelvic rocking exercises, which can ease lower back stress. Additionally, it relieves back pain and stiffness. Maternal anxiety also decreased as a result of this. In this situation, maternal comfort is improved by quicker labor progression with less medical interventions. Fetal descent can be made easier and less painful by using a birthing ball in conjunction with body positions that take use of gravity, as squatting, kneeling, walking, or sitting on the ball.

These results are consistent with those of **Farrag and Omar (2018)**, who found a statistically significant variances in pain levels throughout the 1<sup>st</sup> stage of labor between the two groups.

The results are consistent with **Marwiyah and Pusporini's (2017)** study, which found that the mean labor pain score was  $6.57 \pm 0.843$  prior to the intervention and dropped to  $6.13 \pm 0.920$  following it. The paired t-test revealed a p-value of 0.005, a mean difference of 0.435, and a standard deviation of 0.662. These findings suggest that endorphin massage, pelvic rocking, and the use of birthing balls all significantly reduce discomfort during the first stage of labor.

Additionally, **Shirazi et al. (2019)** showed that throughout both stages of cervical dilation, labor pain was considerably less in the birth ball exercise group than in the CG ( $P < 0.001$ ).

The study concluded that there was a statistically significant variances between the SG and CG groups in terms of the neonatal Apgar score at the 1<sup>st</sup> and 5<sup>th</sup> minutes. The SG outperformed the control group in the 1<sup>st</sup> and 5<sup>th</sup> minutes. This could be because pelvic rocking activities speed up labor with a gravity impact that reduces fetal fatigue, and birthing ball exercises limit venacava compression and promote fetal blood circulation. This explains why the Apgar scores were higher in the SG than in the CG at both the first and fifth minutes post the birth, which is also consistent with the findings of **Abdullah & Najib (2020)**. Additionally, **Nahid et al. (2017)**, who found that birth ball exercises can reduced the active period of labor without negatively affecting the Apgar score or newborn outcomes.

### **Conclusion:**

Faster cervical dilation, stronger uterine contractions, and significant variations between groups in the mean scores of contraction frequency, interval, length, and

intensity are all benefits of using the birth ball during the 1<sup>st</sup> stage of labor. shorter labor times overall, shorter labor phases, and quicker fetal head descent. The study group outperformed the control groups in terms of labor pain reduction and the Apgar score at the 1<sup>st</sup> and 5<sup>th</sup> minutes. As a result, the research hypothesis was validated.

### **Recommendations:**

- Provide a program for staff training on the usage of birthing ball exercises as an evidence-based intervention for expectant mothers in Egyptian maternity care hospitals.
- Participate in this study as the first step toward an evidence-based labor unit for primiparous women.
- A poster, booklet, and film showing the advantages of pelvic rocking exercises and sitting on the birth ball in prenatal clinics and labor rooms

### **Further researches:**

- Use a larger sample size for the study so that the results can be applied more broadly.
- To determine the actual incidence of birthing ball exercises and their associated among pregnant Egyptian women, more multicenter research is required.

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التوجيه القائم على الأدلة حول تمرين كرة الولادة خلال المرحلة الأولى من المخاض على معايير نتائج الولادة  
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الولادة من اهم الاحداث التى تعيشها المرأة والخوف من آلام المخاض هو أحد أهم أسباب عدم رغبة المرأة للولادة الطبيعية لذلك فإن تغيير وضعية السيدات أثناء الولادة يلعب دوراً رئيسياً في تقليل آلام الولادة و تحسين تجربة الولادة الإيجابية. وتم إدخال كرة الولادة إلى أماكن الولادة لتسهيل حركة النساء أثناء الولادة. يتم عمل اوضاع متعددة على هذه الكرة ولها الكثير من الفوائد التي تعود على الأم والجنين . لذلك هدفت الدراسة الي تقييم تأثير المبادئ التوجيهية القائمة على الأدلة لممارسة كرة الولادة خلال المرحلة الأولى من المخاض على نتائج معايير الولادة. تم استخدام تصميم تجريبي لإجراء هذه الدراسة. أجريت هذه الدراسة بوحدة الولادة بقسم أمراض النساء والتوليد بمستشفى جامعة بنها, وحدة الولادة الطبيعية. تضمنت هذه الدراسة ٢٠٠ سيدة بكرية فى مرحلة الولادة وتنطبق عليهم مواصفات العينة. تم تقسيم العينة الى مجموعتين: مجموعة الدراسة وعددها (١٠٠سيدة) و المجموعة الضابطة وعددهم ١٠٠سيدة. حيث كشفت النتائج أن استخدام كرة الولادة خلال المرحلة الأولى من المخاض يُظهر نتائج فعالة لتقدم المخاض للأم (انقباضات أقوى للرحم ، وتوسع أسرع لعنق الرحم. مدة أقصر للمراحل الثلاث من المخاض) ، مما يدعم فرضيات الدراسة. كما اوصت الدراسة اقتراح بروتوكول لاستخدام تمارين كرة الولادة للحوامل في مستشفيات خدمات الولادة في مصر. زيادة الوعي بين مقدمي الرعاية الصحية وخاصة الممرضات المتخصصات حول أهمية ممارسة تمارين كرة الولادة أثناء الحمل والولادة.